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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|--------------------------------|------------------------|
| 10/710,704 | 07/29/2004 | Jake Friedman | PES-0212 | 4703 |
| 23462 7590 12/07/2007 CANTOR COLBURN, LLP - PROTON 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 | | | EXAMINER ALEJANDRO, RAYMOND | |
| | | | ART UNIT 1795 | PAPER NUMBER |
| | | | MAIL DATE 12/07/2007 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|-------------------|-----------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/710,704 | FRIEDMAN ET AL. | |
| | Examiner | Art Unit | |
| | Raymond Alejandro | 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 16-26 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-26, 28-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 November 2007 and 29 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/19/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This office action is responsive to the amendment filed 11/05/07. The applicant has overcome most of the objections, 35 USC 112 rejections, and the anticipatory rejection. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, all pending claims (including new claims 28-30) are finally rejected over new grounds of rejection as posited hereinbelow on the written record:

Drawings

1. The drawings were received on 11/05/07. These drawings are acceptable.

Claim Objections

2. Claims 1 and 23 are still objected to because of the following informalities: the abbreviation "MEA" should be changed and expanded to recite their specific terminology or nomenclature. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-14, 16-26 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al 2003/0064279 in view of Yosida et al 6566001.

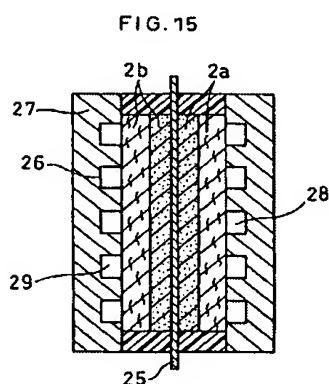
The present invention is directed to an electrochemical cell wherein the disclosed inventive concept comprises the specific carbon layer (gas diffusion layer) having a plurality of flowchannels.

With regard to claims 1 and 23:

Yoshida et al disclose a polymer electrolyte fuel cell (*the electrochemical cell*) comprising an ion conductive polymer electrolyte membrane, a pair of gas diffusion electrodes provided to sandwich therebetween the polymer electrolyte membrane (P0035, 0124-0125),

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thereby to form a polymer electrolyte membrane electrode assembly, and a pair of separator plates being provided to sandwich therebetween the polymer electrolyte membrane electrode assembly at the pair of gas diffusion electrodes and having gas flow channels to face the pair of gas diffusion electrodes respectively (P0035, 0124-0125), wherein the pair of gas diffusion electrodes respectively have a pair of catalyst layers to contact the polymer electrolyte membrane, and also have a pair of gas diffusion layers to contact the pair of catalyst layer (P0035, 0124-0125), wherein each of the gas diffusion layers comprises a carbon cloth having first mesh portions and second mesh portions, wherein the second mesh portions are coarser than the first mesh portions, and are distributed among the first mesh portions intermittently in a direction of the surface plane thereof (P0035, 0124-0125). *In this case, the gas diffusion layer represents the carbon layer comprising the integrated flow-channels and having the specified width.* **Figure 15** below illustrates the polymer electrolyte membrane 25; the gas diffusion electrodes 2a, 2b; and a pair of separator plates 27 having gas flow channels 26:



Yoshida et al extensively describe the gas diffusion layers as a comprising a layer of carbon cloth (P0035, 0037) or plural layers of carbon cloth (P0069), or carbon paper (P0073).

EXAMPLE I-2 exemplifies the use of a multi-layer carbon cloth 50 (P0095/FIGURE 5); or as

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comprising a porous supporting body 31, made of carbon fibers, a polymer layer 32, and a catalyst layer 33 to form the gas diffusion layer 313 (P0132/FIGURE 13).

FIG. 5

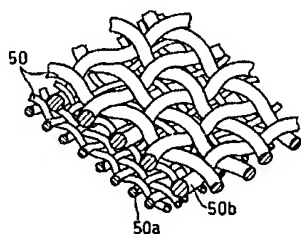
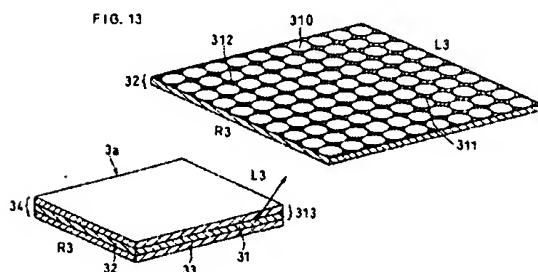


FIG. 13



With regard to claims 2-3, 6, 19-21 and 24-25:

Yoshida et al disclose that hydrogen is fed into the fuel cell (P0002). *Thus, the carbon layer of the gas diffusion layer is compatible with hydrogen.*

With respect to the specific electrical resistivity and compressible characteristic: Yoshida et al extensively describe the gas diffusion layers as comprising a layer of carbon cloth (P0035, 0037) or plural layers of carbon cloth (P0069), or carbon paper (P0073). **EXAMPLE I-2** exemplifies the use of a multi-layer carbon cloth 50 (P0095/FIGURE 5); or as comprising a porous supporting body 31, made of carbon fibers, a polymer layer 32, and a catalyst layer 33 to form the gas diffusion layer 313 (P0132/FIGURE 13). *Thus, the specific electrical resistivity and compressible characteristic (and their respective sufficiency) are inherent characteristics of the carbon cloth material. Accordingly, products of identical chemical composition can not have mutually exclusive properties, and thus, the claimed property (i.e. the specific electrical resistivity), is necessarily present in the prior art material.*

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“Products of identical chemical composition can not have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

See MPEP 2112.01 [R-3] Composition, Product, and Apparatus Claims

With regard to claims 4-5, 18 and 22-23:

Yoshida et al extensively describe the gas diffusion layers as comprising a layer of carbon cloth (P0035, 0037) or plural layers of carbon cloth (P0069), or carbon paper (P0073).

EXAMPLE I-2 exemplifies the use of a multi-layer carbon cloth 50 (P0095/FIGURE 5); or as comprising a porous supporting body 31, made of carbon fibers, a polymer layer 32, and a catalyst layer 33 to form the gas diffusion layer 313 (P0132/FIGURE 13). *Thus, any one of the additional layers may act as the pressure pad. Note that claim 5 recites that the pressure pad consists essentially of compressible carbon.*

With regard to claims 7-8:

Yoshida et al's carbon cloth or carbon paper or carbon layers are free of metal (P0035, 0037, 0069, 0073) because they do not discuss the inclusion thereof in the carbon material.

With regard to claims 9 and 26:

Yoshida et al disclose a pair of gas diffusion layers to contact the pair of catalyst layer (P0035, 0124-0125), wherein each of the gas diffusion layers comprises a carbon cloth having first mesh portions and second mesh portions, wherein the second mesh portions are coarser than the first mesh portions, and are distributed among the first mesh portions intermittently in a direction of the surface plane thereof (P0035, 0124-0125). *In this case, the gas diffusion layer*

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represents the carbon layer comprising the integrated flow-channels and having the specified width.

With regard to claims 10 and 17:

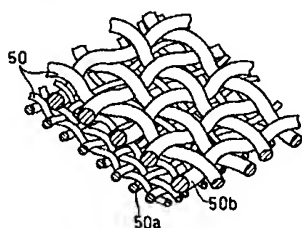
Reference numerals 18 or 118 in FIGURES 1 and 3, respectively are gaskets (P0004, 0092). *In this case, they also represents the frame member without fluid flow channels.*

With regard to claims 11-13, 28 and 30:

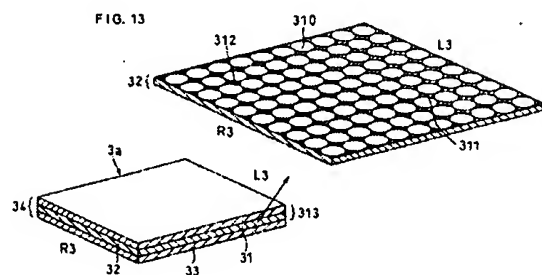
Yoshida et al extensively describe the gas diffusion layers as a comprising a layer of carbon cloth (P0035, 0037) or plural layers of carbon cloth (P0069), or carbon paper (P0073).

EXAMPLE I-2 exemplifies the use of a multi-layer carbon cloth 50 (P0095/FIGURE 5); or as comprising a porous supporting body 31, made of carbon fibers, a polymer layer 32, and a catalyst layer 33 to form the gas diffusion layer 313 (P0132/FIGURE 13). Each of the gas diffusion layers comprises a carbon cloth having first mesh portions and second mesh portions, wherein the second mesh portions are coarser than the first mesh portions, and are distributed among the first mesh portions intermittently in a direction of the surface plane thereof (P0035, 0124-0125). *In this case, the gas diffusion layer represents the carbon layer comprising the integrated flow-channels and having the specified width.* It can be appreciated that the flowchannels extend through the thickness of the layer and are situated inboard of the layer edge (See FIGURES 5 and 13).

FIG. 5



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With regard to claim 14:

Figure 13 above illustrates flowchannels extending to the edge of the carbon layer.

With regard to claim 16:

Yoshida et al disclose a porous supporting body 31 (P0132/FIGURE 13).

Yoshida et al disclose an electrochemical cell as described and illustrated above.

However, the preceding prior art reference does not expressly disclose the specific plurality of continuous uninterrupted flowchannels with the specific width/webbing width, length/width and depth/thickness relationship and the length extending from one edge to an opposite edge.

As to claims 1 and 23:

Yosida et al'001 teaches a fuel cell including a solid polymer exchange membrane sandwiched the anode electrode and the cathode electrode (ABSTRACT/COL 1, lines 14-20) with a fuel cell element comprising a plurality of continuous uninterrupted flowchannels wherein the width of the flowchannels is at least equal to or less than width of the webbing between adjacent flow channels, and wherein the length of the flowchannels is greater than the width thereof, and the length of the flow channel extends substantially from one edge of the element to the opposite edge thereof (See **FIGURES 3 and 5-6**).

FIG. 3

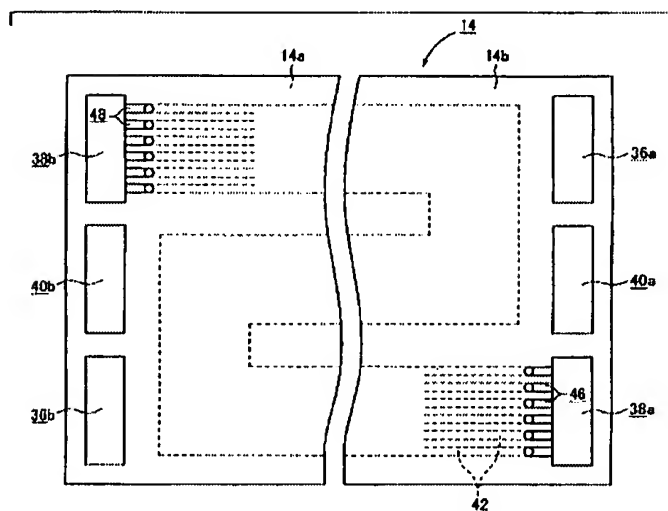


FIG. 5

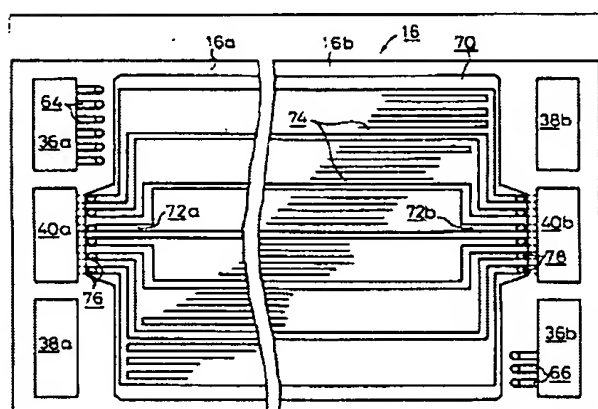
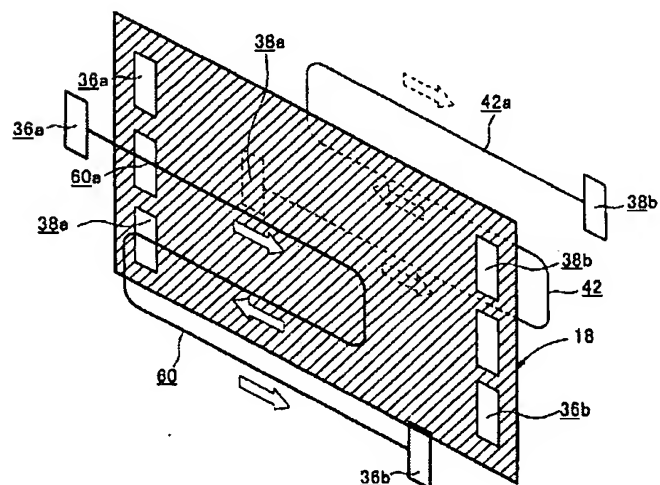


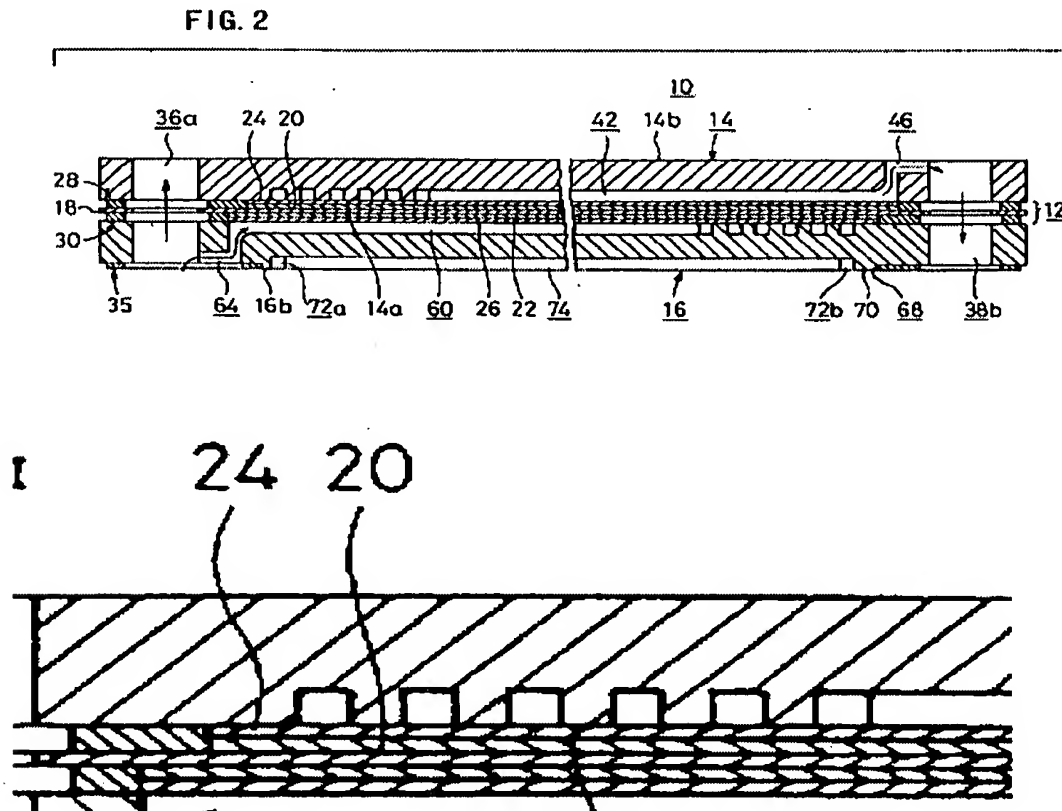
FIG. 6



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As to claims 29:

Figure 2 of Yosida et al illustrates the fuel cell element wherein the depth of the flowchannels is less than its thickness (See **FIGURE 2** and **Enlarged Portion of FIGURE 2**):



In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time of invention to configure the carbon layer of Yoshida et al'279 by having the specific plurality of continuous uninterrupted flowchannels with the specific width/webbing width, length/width and depth/thickness relationship and the length extending from one edge to an opposite edge of Yosida et al'001 because the flowchannel configuration of Yosida et al'001 yields the predictable results of permitting efficient and smooth fluid distribution throughout its surface.

Therefore, the present claims would have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of

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ordinary skill in the art, in view of the teaching of the technique for improvement in other situations (*i.e. effective flowchannels for separators used in the same fuel cell device*). Stated differently, use of known technique to improve similar devices (methods, or products) in the same way is prima-facie obvious. *KSR International Co. v. Teleflex Inc.*, 550 US- 82 USPQ2d 1385, 1396 (2007). If a person of ordinary skill can implement a predictable variation or obtain a predictable result or characteristic, 35 USC 103 likely bars its patentability. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1739 (U.S. 2007) & *KSR International Co. v. Teflex Inc.*, 550 US, 82 USPQ2d 1385 (2007). If a technique has been used to improve one device or product (*specifically configured flowchannels in a fuel cell element for achieving an efficient and smooth fluid distribution*), and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way (*the porous carbon layer directly facing a fuel cell separator defining a flow field*), using the known technique is obvious unless its actual application is beyond his or her skill. *See KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1739 (U.S. 2007) & *KSR International Co. v. Teflex Inc.*, 550 US, 82 USPQ2d 1385 (2007).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond Alejandro
Primary Examiner
Art Unit 1795



RAYMOND ALEJANDRO
PRIMARY EXAMINER